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REF. 2 89383
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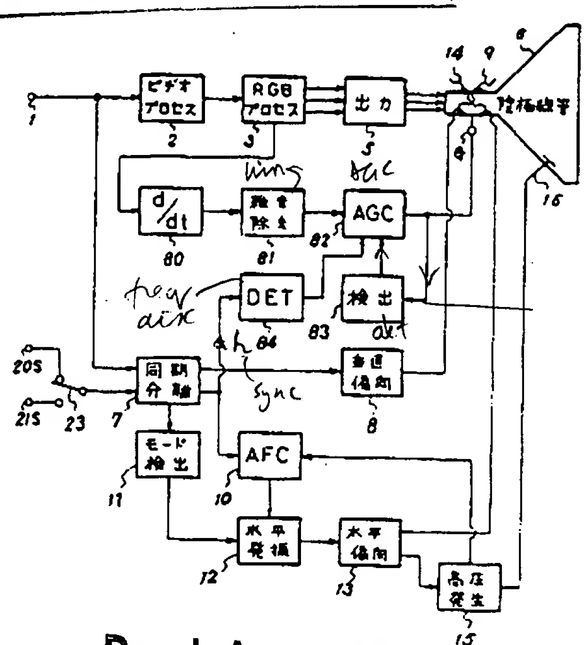

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PUBLICATION NUMBER : 61099467
PUBLICATION DATE : 17-05-86

APPLICATION DATE : 19-10-84
APPLICATION NUMBER : 59219960

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INT.CL. : H04N 3/27 H04N 3/32

TITLE : TELEVISION RECEIVER OF MULTISCANNING TYPE

ABSTRACT : PURPOSE: To modulate the scanning speed of an electron beam well even for input signals different in horizontal frequency by detecting a horizontal deflecting frequency of a horizontal deflecting circuit which is switched in accordance with the horizontal frequency of the input signal and controlling the modulation quantity of the scanning speed by this detection output.

CONSTITUTION: The luminance signal of an RGB process circuit 3 is supplied to the first differentiating circuit 80, and the differential output is supplied to an AGC circuit 82 incorporating the second differentiating circuit through a noise eliminating circuit 81 which eliminates signals having a certain amplitude or narrower. The output of this AGC circuit 82 is supplied as a scanning speed modulating signal to a terminal G for scanning speed modulation of a cathode-ray tube 6 and a detecting circuit 83 of a peak-to-peak value of the modulation quantity of the scanning speed, and the detection output of the detecting circuit 83 is supplied to the gain control terminal of the AGC circuit 82. Meanwhile, the horizontal synchronizing signal from a synchronizing signal separating circuit 7 is supplied to a frequency discriminator 84, and the output signal is supplied to a time constant control terminal of the AGC circuit 82. In this case, the time constant of the AGC circuit 82 is made larger in proportion to the input frequency of the frequency discriminator 84.

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AJ RCA/ 89,383
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Japanese Kokai Patent Application No. Sho 61[1986]-99467

Translated from Japanese by the Ralph McElroy Translation Company
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Code: 228-77676
Ref.: RCA89383PCT/FAD#4917

JAPANESE PATENT OFFICE
PATENT JOURNAL (A)
KOKAI PATENT APPLICATION NO. SHO 61[1986]-99467

Int. Cl.[4]:	H 04 N 3/27 3/32
Sequence Nos. for Office Use:	6668-5C 6668-5C
Filing No.:	Sho 59[1984]-219960
Filing Date:	October 19, 1984
Publication Date:	May 17, 1986
No. of Inventions:	1 (Total of 8 pages)
Examination Request:	Not filed

MULTISCAN TV RECEIVER

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[There are no amendments to this patent.]

Claim

Multiscan TV receiver wherein the horizontal frequency of the input signal is detected and converted to a voltage, the voltage is applied to a horizontal deflecting circuit, and the horizontal deflecting frequency of the horizontal deflecting circuit is switched to receive the input signals at different horizontal frequencies, characterized in that said horizontal deflecting frequency is detected, and, based on the detection result, the scanning rate modulation amount is controlled.

Detailed explanation of the invention

Industrial application field

The present invention pertains to a multiscan TV receiver which can not only receive conventional TV broadcasting signals, but can also receive video signals having different horizontal frequencies from a converter that doubles the number of scan lines, or the like.

Prior art

For an NTSC format TV signal, pictures are formed at a vertical frequency of about 60 Hz and a horizontal frequency of about 15.75 kHz. A converter has been proposed to improve the image quality by performing signal processing or the like to double the scan lines. When this device is used, the output signal has a vertical frequency of about 60 Hz and a horizontal frequency of about 31.5 kHz.

Also, the output signal for a so-called high-resolution display computer screen has a horizontal frequency of about 24 kHz. Also so-called high-definition TV has a planned horizontal frequency of about 33.75 kHz.

At present, a multiscan TV receiver is proposed as a single device for receiving all of the aforementioned signals having different horizontal frequencies.

First of all, the multiscan TV receiver that was first proposed by the present patent applicant will be explained with reference to Figures 4-6.

Figure 4 is a block diagram illustrating the overall receiver. For the receiver shown in this figure, when a conventional video signal is received from conventional TV broadcasting tuners, tape recorders, video disk players, satellite broadcasting tuners, certain personal computers, or the like, the video signal fed to input terminal (1) goes through video processing circuit (2) to

RGB processing circuit (3) to form the three primary color signals. Also, the video/RGB switch signal fed to input terminal (4) is fed to RGB processing circuit (3), and the three primary color signals separated from the video signal are fed through output circuit (5) to CRT (6).

Also, the video signal from input terminal (1) is fed to sync separating circuit (7) and the video signal is separated into vertical and horizontal sync signals. In addition, the switch signal from input terminal (4) is fed to sync separating circuit (7), and the vertical sync signal separated from the video signal is sent to vertical deflecting circuit (8). The vertical deflecting signal formed by this circuit is fed to vertical deflecting yoke (9) of CRT (6). Conversely, the horizontal sync signal separated from the video signal by sync separating circuit (7) is fed to AFC circuit (10) and mode detecting circuit (11). The signal from said AFC circuit (10) is sent to horizontal oscillating circuit (12), and the normal-mode control signal from mode detecting circuit (11) is sent to horizontal oscillating circuit (12). The signal from said horizontal oscillating circuit (12) is fed to horizontal deflecting circuit (13), and the horizontal deflecting signal formed by this circuit is sent to horizontal deflecting yoke (14) of CRT (6). In addition, the signal from horizontal deflecting circuit (13) is sent to flyback transformer or another high-voltage generator (15), and the high voltage formed there is sent to high-voltage terminal (16) of CRT (6), and, a portion of the signal is sent to AFC circuit (10).

Also, household power is fed from power source input (17) to power source circuit (18), and, corresponding to the signal from mode detecting circuit (11), the normal-mode voltage is fed to horizontal deflecting circuit (13). Also, the household power from power source input (17) is sent to another power source circuit (19), and the voltage formed there is sent to other circuits.

In this way, conventional video signals can be received. On the other hand, in the case of reception of digital or three analog R, G and B primary color signals (referred to as RGB signals hereinafter) from certain computers, as well as from so-called caption demodulators, teletext demodulators, scanning converters, etc., the digital RGB signals fed to input terminals (20R), (20G) and (20B) and the analog RGB signals sent to input terminals (21R), (21G) and (21B) are selected by switch (22) and fed to RGB processing circuit (3), and they are selected and fed to output circuit (5) by means of the switching signal from input terminal (4).

The digital sync signal from input terminal (20S) and the analog sync signal from input terminal (21S) are selected by switch (23) and fed to sync separating circuit (7). By means of the switching signal from input terminal (4), the signal is selected and fed to vertical deflecting circuit (8) and AFC circuit (10). In addition, the signal from sync separating circuit (7) is sent to mode detecting circuit (11), and, corresponding to the frequency of the horizontal sync signal, a control signal is formed and sent to horizontal oscillating circuit (12), horizontal deflecting circuit (13), and power source circuit (18).

In this way, digital or analog RGB signals can be received. In addition, in the case of so-called superimposed reception with RGB signals superimposed on a conventional video signal for display, the switching signal sent to input terminal (4) is set in the RGB mode, and, at the same time, the Ys signal, which indicates the position of the superimposed signal sent to input terminal (24), and the Ym signal, which indicates the superimposed range, are sent to RGB processing circuit (3). The video signal and RGB signal are switched between these Ys and Ym signals.

As explained above, various signals are received. In addition, in the aforementioned device, the horizontal deflecting system may have the following specific configuration. In Figure 5, the horizontal sync signal from sync separating circuit (7) is fed through horizontal sync signal input terminal (7B) to frequency-voltage converter (FVC) (31) that forms mode detecting circuit (11) to form a voltage corresponding to the horizontal frequency. The output voltage of FVC (31) is fed to fixed contact point (32b) on one side of switch (32), while the other fixed contact point (32c) of switch (32) is grounded via reference voltage source (33). In this case, the voltage value of reference voltage source (33) is set equal to the voltage value obtained when a horizontal sync signal of, say, NTSC format and having a horizontal frequency of about 15.75 kHz is input to the FVC (31). Also, for switch (32), the video/RGB switching signal from input terminal (4) is sent through video RGB switching signal input terminal (4a) to its control terminal. When the video/RGB switching signal indicates a video signal input, movable contact point (32a) of switch (32) is connected to fixed contact point (32c) on the other side. Conversely, when video/RGB switching signal indicates the RGB signal input, movable contact point (32a) of switch (32) is connected to fixed contact point (32b) on the other side. The voltage obtained from movable contact point (32a) of said switch (32) is sent to voltage-controlled oscillator (VCO) (35) that forms horizontal oscillating circuit (12) via buffer amplifier (34). The oscillation output of VCO (35) is sent through driver (36) to switching transistor (37) that forms horizontal deflecting circuit (13).

Also, the voltage obtained at movable contact point (32a) of switch (32) is sent through gain control amplifier (38) to, say, Y-Z type parametric power source circuit (39) that forms power source circuit (18). The output voltage of said power source circuit (39) is fed back through voltage divider (40) to gain control amplifier (38). The output voltage is fed to flyback transformer (41).

Switching transistor (37) is connected to said flyback transformer (41). Also, said switching transistor (37) is connected in parallel to damper diode (42), resonant capacitor (43), and a series circuit consisting of horizontal deflecting yoke (14) and S-shape compensating capacitor (44).

Also, while the horizontal sync signal is sent to detecting circuit (45) that forms AFC circuit (10), and, at the same time, the signal from voltage divider (46) set in series to switching transistor (37) is sent to detecting circuit (45), an AFC signal is formed. This signal goes through low-pass filter (LPF) (47) and is fed to the control terminal of VCO (35).

In addition, capacitors (49) and (50) are connected to switching circuit (48) in parallel to resonant capacitor (43). Also, capacitors (52) and (53) are connected to switching circuit (51) in parallel to S-shaped correcting capacitor (44). Also, the voltage from FVC (31) is sent to comparator (54), which performs binary comparison corresponding to the voltages of the input horizontal frequencies of, say, 20 kHz and 30 kHz, and forms a 3-value comparison result corresponding to the three ranges of 20 kHz or lower, 20-30 kHz, and 30 kHz or higher. Then, the two switches contained in switching circuits (48) and (51), respectively, are controlled such that both switches are OFF or one switch is ON one switch is OFF corresponding to the comparison result.

In this way, in the horizontal deflecting system, by means of VCO (35), in synchronization to the input horizontal sync signal, an oscillating signal is formed which can change within the range 15-34 kHz, and horizontal deflection is carried out, and, at the same time, by means of power source circuit (39), corresponding to the horizontal frequency, a voltage that can change within the range 58-123 V is formed, and control is performed to ensure a constant amplitude of the horizontal deflection. Also, parallel to resonant capacitor (43) and S-shaped correcting capacitor (44), capacitors (49), (50) and (52), (53), respectively, are connected corresponding to the range of horizontal frequencies to adjust for the characteristics.

The specific configuration of the vertical deflecting system in the aforementioned device is as follows. As shown in Figure 6, the vertical sync signal from sync separating circuit (7) is sent through vertical sync signal input terminal (7V) to sawtooth wave oscillator (61) that forms vertical deflecting circuit (8), and a sawtooth wave is generated by the charging/discharging of capacitor (62) by current from current source (63). The sawtooth wave is sent to comparator (64) to form a 3-value comparison result corresponding to within a prescribed voltage range, lower than this range, and higher than this range. The comparison result is sent to the control terminal of up/down counter (UDC) (65). A vertical sync signal is sent to the counting terminal of UDC (65). The count value of UDC (65) is sent to DA converter (DAC) (66), and the converted analog value is used to control current source (63).

In this way, from sawtooth wave oscillator (61), a sawtooth wave with a peak value (amplitude) controlled within a prescribed voltage range independent of the frequency of the vertical sync signal is output. This sawtooth wave is sent through output circuit (67) to vertical deflecting yoke (9). Also, a series circuit of capacitor (68) and resistor (69) is connected in series

to said vertical deflecting yoke (9), and voltage divider (70) is connected parallel to said resistor (69). The voltage dividing output of said voltage divider (70) is sent to output circuit (67).

In this way, even when the vertical frequency varies, vertical deflection is always performed at a constant amplitude. In addition, by having one of the resistors that form voltage divider (70) as a variable resistor, it is possible to control the amplitude of the vertical deflection at will.

There is another circuit consisting of the group of sawtooth wave oscillator (61)-DAC (66) (oscillator (71)-DAC (76)). The output value of DAC (76) of this circuit is sent to pincushion distortion correcting signal generator (77), and, at the same time, the parabola signal of the vertical synchronization is sent from the node between deflecting yoke (9) and capacitor (68) to generator (77) to form the pincushion distortion correcting signal. This signal is sent to a pincushion distortion correcting circuit.

As explained above, corresponding to various different horizontal and vertical frequencies, the necessary horizontal deflection and vertical deflection are carried out, respectively, and, at the same time, various types of signals can be received by the aforementioned device.

Problems to be solved by the invention

In the prior art, ghosts in the picture are removed by means of so-called scanning rate modulation, in which the horizontal scanning rate of the electron beam is adjusted so that it is faster or slower at the dark/bright boundaries in the picture. In the scanning rate modulation, the scanning rate modulating signal shown in Figure 7B and obtained by calculating the second derivative of the video signal is applied to the scanning rate modulating terminal of the 4th grid of CRT (6), so that corresponding to the scanning rate modulating amount, the electron beam is electrostatically deflected, and the scanning rate is adjusted as shown in Figure 7A.

However, in the aforementioned multiscan TV receiver, the horizontal frequency of the input signal is not constant. Consequently, when the horizontal frequency becomes higher, the peak-to-peak value of the scanning rate modulating amount of the scanning rate modulating signal shown in Figure 8B becomes larger than necessary. When this scanning rate modulating amount is used for the electrostatic deflection of the electron beam in order to change the scanning rate, as shown in Figure 8A, the electron beam goes backward at the dark/bright boundaries in the picture.

The purpose of the present invention is to solve the aforementioned problems of the conventional technology by providing a multiscan TV receiver characterized by the fact that the scanning rate modulation is suitable for the electron beam even when the horizontal frequency of the input signal changes.

Means to solve the problems

The present invention provides a multiscan TV receiver wherein the horizontal frequency of the input signal is detected and converted to a voltage, the voltage is applied to horizontal deflecting circuit (13), and the horizontal deflecting frequency of said horizontal deflecting circuit (13) is switched to receive the input signals at different horizontal frequencies, characterized in that said horizontal deflecting frequency is detected, and, based on the detection result, the scanning rate modulation amount is controlled.

Operation

With this constitution, the horizontal deflecting frequency of horizontal deflecting circuit (13) switched corresponding to the horizontal frequency of the input signal is detected, and, by the detected result, the scanning rate modulating amount is controlled, so that scanning rate modulation of the electron beam can be carried out appropriately even when the horizontal frequency of the input signal changes.

Application examples

In the following, the multiscan TV receiver of the present invention will be explained in more detail with reference to an application example illustrated by Figures 1-3. In Figures 1-3, the same part numbers as those in Figures 4-6 are used, and they will not be explained in detail again.

In this application example, as shown in Figure 1, the brightness signal of RGB processing circuit (3) is sent to first differentiating circuit (80). The differential output of said first differentiating circuit (80) is sent through noise eliminator (81) which eliminates signals lower than a prescribed amplitude to AGC circuit (82) incorporated in the second differentiating circuit. The output signal of AGC circuit (82) is sent as the scanning rate modulating signal to scanning rate-modulating terminal G of the 4th grid of CRT (6) and peak-to-peak value detecting circuit (83). The detection result of said detecting circuit (83) is sent to the gain control terminal of AGC circuit (82). In this case, AGC circuit (82) is controlled by the detection result of detecting circuit (83) so that the peak-to-peak value of the scanning rate modulating amount becomes the prescribed value.

The horizontal sync signal from sync separating circuit (7) is fed to frequency discriminator (84), and the output signal of said frequency discriminator (84) is sent to the time constant control terminal of AGC circuit (82). In this case, the time constant of AGC circuit (82) rises in proportion to the input frequency of frequency discriminator (84).

The horizontal deflecting unit and the vertical deflecting unit have the same configurations as those of the multiscan TV receiver shown in Figures 4-6.

For this configuration, when a video signal at a horizontal frequency of about 15.734 kHz is input to input terminal (1), the video signal is sent through video processing circuit (2) to RGB processing circuit (3). The three primary color signals from RGB processing circuit (3) are sent through output circuit (5) to CRT (6), and, at the same time, the luminance signal from RGB processing circuit (3) is sent through first differentiating circuit (80) and noise eliminator (81) to AGC circuit (82). In this case, the horizontal sync signal at about 15.734 kHz from sync separating circuit (7) is subjected to frequency discrimination, and the obtained output signal of frequency discriminator (84) is used to set the time constant of AGC circuit (82) to the prescribed value corresponding to a horizontal deflecting frequency of about 15.734 kHz. By means of said AGC circuit (82), the second derivative is calculated, and the scanning rate modulating signal shown in Figure 2B with a peak-to-peak value set at a prescribed value by the detection result of detecting circuit (83) is applied to scanning rate modulating terminal G of the 4th grid of CRT (6). Consequently, as shown in Figure 2B, by means of the scanning rate modulating signal having a prescribed scanning rate modulating amount, the electron beam is deflected electrostatically, and, as shown in Figure 2A, the scanning rate modulation of the electron beam is good.

Also, when a video signal having a relatively high horizontal frequency, say, about 31.468 kHz, is input to input terminal (1), the video signal is sent through video processing circuit (2) to RGB processing circuit (3). The three primary color signals from RGB processing circuit (3) are sent through output circuit (5) to CRT (6), and, at the same time, the luminance signal from RGB processing circuit (3) is sent through first differentiating circuit (80) and noise eliminator (81) to AGC circuit (82). In this case, the horizontal sync signal at about 31.468 kHz from sync separating circuit (7) is subjected to frequency discrimination, and the obtained output signal of frequency discriminator (84) is used to set the time constant of AGC circuit (82) to the prescribed value corresponding to a horizontal deflecting frequency of about 31.468 kHz. By means of said AGC circuit (82), the second derivative is calculated, and the scanning rate modulating signal shown in Figure 3B and having a peak-to-peak value set at the prescribed value by the detection result of detecting circuit (83) is applied to scanning rate modulating terminal G of the 4th grid of CRT (6). Consequently, as shown in Figure 3B, by means of the scanning rate modulating signal having a prescribed scanning rate modulating amount, the electron beam is deflected electrostatically, and, as shown in Figure 3A, the scanning rate modulation of the electron beam is good.

As explained above, in the multiscan TV receiver of this application example, the horizontal frequency of the input signal is detected and converted to a voltage, and this voltage is applied to horizontal deflecting circuit (13). The horizontal deflecting frequency of said horizontal deflecting circuit (13) is switched to receive the input signals at different horizontal

frequencies. In this multiscan TV receiver, the horizontal deflecting frequency is detected, and, by means of the detection result, the scanning rate modulating amount is controlled. Consequently, even for input signals at different horizontal frequencies, it is still possible to perform good scanning rate modulation of the electron beam. This is an advantage.

Of course, the present invention is not limited to the aforementioned application example. As long as the main points of the present invention are observed, various other configurations may be adopted.

Effect of the invention

For the multiscan TV receiver of the present invention, good scanning rate modulation of the electron beam can be realized for input signals having different horizontal frequencies, and it is possible to obtain good pictures without ghosts. This is an advantage.

Brief description of the figures

Figure 1 is a structural diagram illustrating an application example of the main portion of the multiscan TV receiver in the present invention. Figures 2 and 3 are diagrams for the explanation of Figure 1. Figure 4 is a block diagram illustrating an example of the multiscan TV receiver. Figure 5 is a structural diagram illustrating the horizontal deflecting unit which is a portion of Figure 4. Figure 6 is a structural diagram illustrating the vertical deflecting unit which is a portion of Figure 4. Figures 7 and 8 are diagrams illustrating the scanning rate modulation.

3	RGB processing circuit
6	CRT
7	Sync separating circuit
80	First differentiating circuit
81	Noise eliminator
82	AGC circuit
83	Detecting circuit
84	Frequency discriminator
G	Scanning rate modulating terminal of the 4th grid of CRT

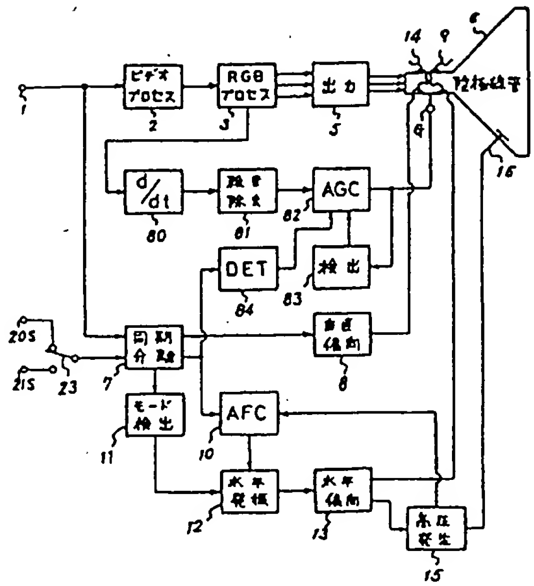
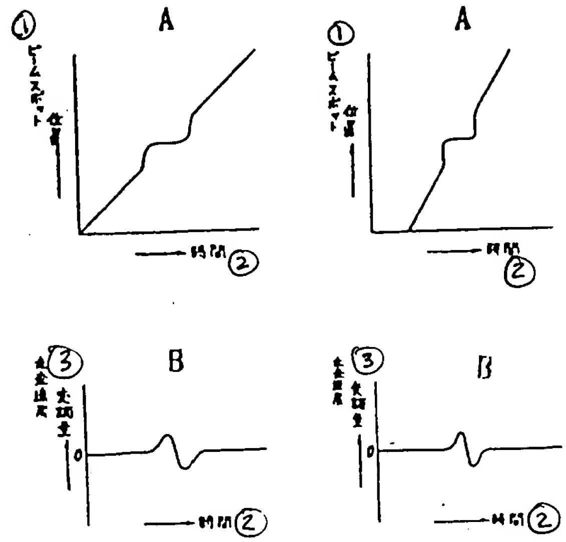


Figure 1

Key:
2 Video processing circuit
3 RGB processing circuit
5 Output circuit
6 CRT
7 Sync separation circuit
8 Vertical deflecting circuit
81 Noise eliminator
83 Detecting circuit
11 Mode detecting circuit
12 Horizontal oscillating circuit
13 Horizontal deflecting circuit
15 High-voltage generator



Figures 2 and 3

Key: 1 Beam spot position
2 Time
3 Scanning rate modulating amount

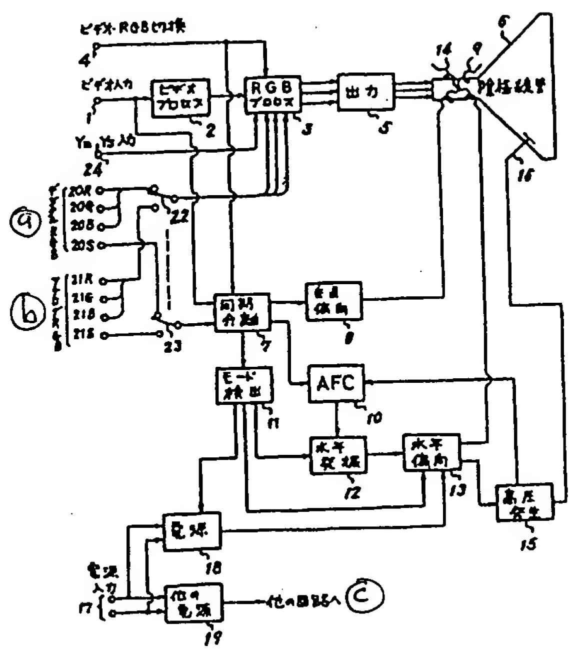


Figure 4

Key: a Digital RGB
b Analog RGB
c To other circuits
1 Video input

2 Video processing circuit
3 RGB processing circuit
4 Video-RGB switching
5 Output circuit
6 CRT
7 Sync separating circuit
8 Vertical deflecting circuit
11 Mode detecting circuit
12 Horizontal oscillating circuit
13 Horizontal deflecting circuit
15 High-voltage generator
17 Power source input
18 Power source
19 Other power source

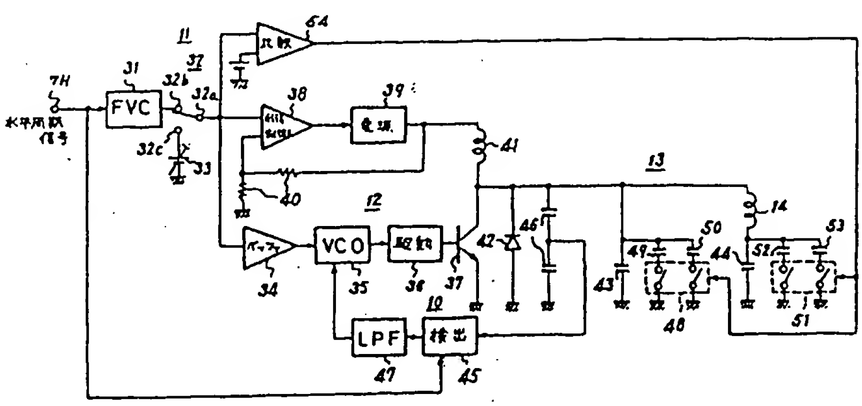


Figure 5

Key: 7H Horizontal sync signal
34 Buffer
36 Driving circuit
38 Gain control
39 Power source
45 Detecting circuit
54 Comparator

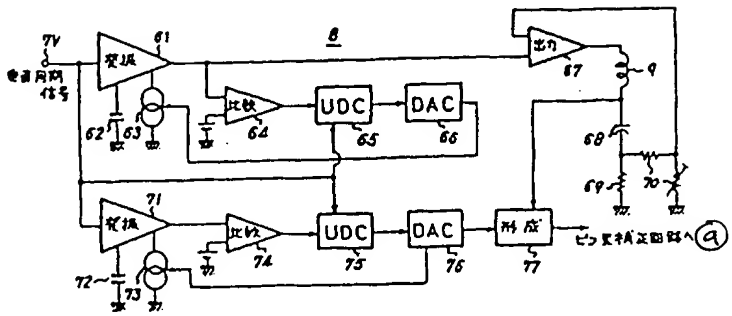
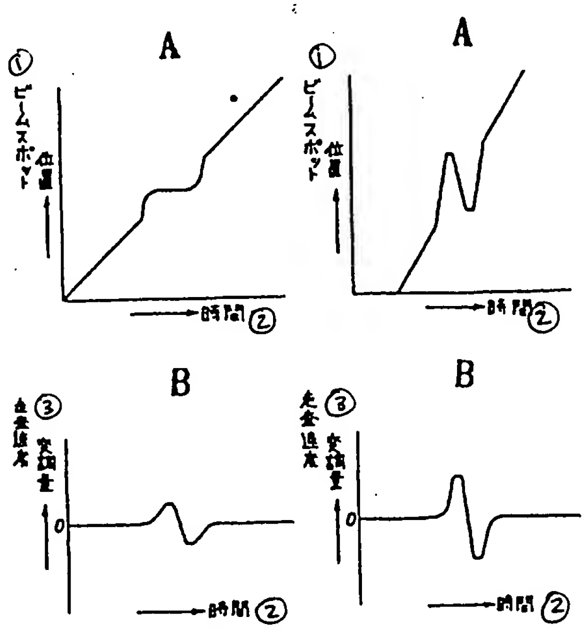


Figure 6

Key: a To pincushion distortion correcting circuit
- 7V Vertical sync signal
- 61 Oscillator
- 64 Comparator
- 67 Output circuit
- 71 Oscillator
- 74 Comparator
- 77 Generator



Figures 7 and 8

Key:	1	Beam spot position
	2	Time
	3	Scanning rate modulating amount

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